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Food Plants of a Supralittoral Hydrophilid Beetle, *Cercyon* (*Cercyon*) *dux* (Coleoptera, Hydrophilidae)

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Cercyon (*Cercyon*) *dux* SHARP, 1873 is a supralittoral Hydrophilid beetle that is widely distributed along the shorelines from the southern Kuril Isls. to Kyushu Is., and it is commonly present along the cobble and shingle beaches of Japan (ÔHARA & JIA, 2006; SATÔ, 1981, 1989; SHARP, 1873; SHATROVSKIY, 1989, 1992). Its adults feed on detritus such as seaweeds and sea grasses that drift ashore (HANSEN, 1999; ÔHARA & JIA, 2006). However, it is still poorly known for the food plant utilization of *C.* (*C.*) *dux* to each seaweed and sea grass, although they would be frequently observed under the decomposed sea tangle more than the other seaweeds and sea grass in field condition (ÔHARA & KOBAYASHI, personal observations). In this paper, I examine the food acceptance tests of *C.* (*C.*) *dux* for the commonly observed seaweeds (sea tangle, sea lettuce, and gulfweed) and sea grass (tape grass) along the seaside shorelines of Hokkaido.

Materials and Methods

Non-choice feeding tests were carried out to detect the acceptability for seaweeds and sea grass. A total of 31 adult individuals of *Cercyon* (*Cercyon*) *dux* were sampled from four localities in Hokkaido as follows: Onishika, Obira, Rumoi (N 44° 03′ 14″, E 141° 39′ 14″, 4 indiv.); Bikuni, Furubira (N 43° 17′ 44″, E 140° 36′ 47″, 8 indiv.); Nishikioka, Tomakomai (N 42° 35′ 20″, E 141° 27′ 09″, 3 indiv.); Ayoro cape, Noboribetsu (N 42° 27′ 11″, E 141° 12′ 21″, 16 indiv.). In this experiment, three species of seaweeds, sea lettuce (Ulvaceae: *Ulva* sp.), gulfweed (Sargassaceae: *Sargassum* sp.), sea tangle (Laminariaceae: *Laminaria* sp.), and one species of sea grass, tape grass (Zosteraceae: *Phyllospadix* sp.) were examined because these four plant species are commonly found along the beaches of Hokkaido. All plant species were sampled from Shioya, Otaru (N 43° 12′ 54″, E 140° 55′ 16″). Seven to nine individuals were tested for each plant species.

Pieces of plants (about 0.1 g) were each placed in a transparent polystyrene case (65 × 55 × 20 mm), the bottom of which was covered with moist filter paper soaked in marine water. A beetle was released into the case and was allowed to feed on one of four plant species during 48 hours. Prior to the examination, beetles were settled on starvation for 48 hours. The experiments were performed at 20℃ in dark conditions. Since it is impossible to assess the amount of the feeding trace, I checked the acceptance of each plant by the number of beetles' fecal pellets after 48 hours. I pooled the data of different sex and different locality samples, because each sample size is very small. I examined the number of fecal pellets among the treatments using ANOVA. And, for pair-wise comparison between treatments, I used the Turkey-Krammer method.

Results and Discussion

Observed numbers of fecal pellets of *Cercyon* (*Cercyon*) *dux* among treatments were different in food acceptance tests ($F=29.834$, d.f.$=3$, $p<0.0001$, one-way ANOVA). And, in pair-wise comparisons, the number of fecal pellets of *C.* (*C.*) *dux* between treatments was significantly different, except for that between *Sargassum* sp. and *Laminaria* sp. (Table 1).

Fecal pellets of *C.* (*C.*) *dux* were observed in the seaweeds treatments, but they were not observed in the sea grass' (*Phyllospadix* sp.) treatment. Adults of *C.* (*C.*) *dux* would not use

Table 1. Number of fecal pellets of adult individuals of *Cercyon* (*Cercyon*) *dux* for four plant species during 48 hours in non-choice feeding test.

Plant species	(*N*)	Number of fecal pellets in each beetle	Mean±SD
Ulva sp. (Ulvaceae)	(8)	10, 10, 9, 11, 6, 9, 18, 12	10.63 ± 3.46^{a}
Sargassum sp. (Sargassaceae)	(7)	2, 8, 8, 6, 3, 2, 3	4.57 ± 2.70^{b}
Laminaria sp. (Laminariaceae)	(7)	6, 4, 5, 7, 3, 8, 6	5.57 ± 1.72^{b}
Phyllospadix sp. (Zosteraceae)	(9)	0, 0, 0, 0, 0, 0, 0, 0, 0	0 ± 0^{c}

N means the examined number of beetles. Values with different letters are significantly different (Turkey-Krammer method, $P<0.01$).

Phyllospadix sp. as their food plants. In the comparisons of three species of seaweed, the average number of fecal pellets for *Ulva* sp. was significantly higher than those for the rest. The present study suggests that *Ulva* sp. presents a suitable food plant for *C.* (*C.*) *dux*, more than *Sargassum* sp. or *Laminaria* sp. Surprisingly, this result is not consistent with the abundance of *C.* (*C.*) *dux* in the field observation. As mentioned above, adults of this species frequently occur under *Laminaria* sp. more than other seaweeds. Although this inconsistency has not been satisfactorily clarified yet, some other factors could be also influential for the food selection of *C.* (*C.*) *dux* in field conditions, for example, richness of seaweeds at the shoreline, degree of decomposition of seaweeds, etc. Further examinations are highly required.

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